ROYAL ASTRONOMICAL SOCIETY.

Captain W. H. Smyth, R.N., President, in the Chair.

J. C. Adams, Esq. B.A., Fellow and Assistant-Tutor of St. John's College, Cambridge, was balloted for, and duly elected a Fellow of the Society.

The following communications were read:—

I. Elements of the Orbit of the Binary Star γ *Virginis.* By J. R. Hind, Esq. Communicated by the President.

"*July* 7, 1845.

"Sir,—Mr. Bishop has requested me to forward to you the following elements of the binary star γ *Virginis* which I have very recently computed.

Perihelion passage 1836·228.

Perihelion on the Orbit .... $319°\ 46'\!·1$
Node .... $78\ 28·4$
Inclination..................... $25\ 14·1$

Eccentricity 0·85661   ∴ φ = $58°\ 56''·3$

Mean Annual Motion $-\ 152'·871$

Period $141^{yrs·}297.$

"For the calculation of the angles of position in this orbit, we have:—

$$u - [3·46905] . \sin u = [2·18433] (1836·228 - t)$$
$$\tan \tfrac{1}{2} v = [0·55609] . \tan \tfrac{1}{2} u$$
$$\tan (\theta - 78°\ 28'·4) = [9·95644] \tan (v - 118°\ 42''·3)$$

u being expressed in minutes.

" The epochs employed and the errors of my elements are as follows :—

		θ observed.	Comp. — observed.
		° ′	′
Herschel I.	1781·89	130 44	−4·8
——	1803·20	120 19	−1·7
Herschel II. and South	1822·25	103 24	+ 3·5
Dawes	1831·33	78 15	+ 8·8
Captain Smyth.........	1838·28	235 42	+ 9·8
——	1845·34	185 23·3	−5·6

" The sums of the squares of the errors in my orbit = 243·0 : in Mr. Henderson's orbit = 589·0."

" J. R. HIND."

" *Capt. Smyth, R.N., &c. &c.*"

II. Ephemeris of the Periodical Comet of Biela. By J. R. Hind, Esq. Communicated by the President.

The following ephemeris is deduced from the elements given by Professor Santini in the *Astronomische Nachrichten,* and in a separate paper on the subject, published, I believe, in the *Transactions* of the Institute at Venice. I have transformed Santini's expressions for the comet's heliocentric co-ordinates into others involving the eccentric anomaly, whereby the labour of calculating the true anomalies and radii vectores is entirely avoided.

Putting

$$x = m \cdot \sin (A + E) + l$$
$$y = n \cdot \sin (B + E) + r$$
$$z = p \cdot \sin (C + E) + s$$

we have for the values of log m, log n, log p, A, B, C, l, r, and s, for the true equinox of November $1 + t$.

$$\log m = 0·3805632 \quad + 1·17 \cdot t$$
$$\log n = 0·5165741 \quad −0·57 \cdot t$$
$$\log p = 0·0218809 \quad −0·47 \cdot t$$

$$A = 207° \; 10′ \; 25''·5 \quad + 0''·208 \cdot t$$
$$B = 99 \; 47 \; 42·0 \quad + 0·100 \cdot t$$
$$C = 127 \; 35 \; 7·2 \quad + 0·162 \cdot t$$

$$l = + 0·8301040 \quad + 18·60 \cdot t$$
$$r = − 2·4498770 \quad + 5·15 \cdot t$$
$$s = − 0·6306637 \quad + 4·38 \cdot t$$

In these equations E is the comet's eccentric anomaly, and t expresses the number of days counted from 1845, November 1. The coefficients of t are the changes produced by precession, &c. in one day, and will be sufficiently exact for the whole period included in the ephemeris.

The epoch adopted is noon on the meridian of Greenwich, and the comet's positions are referred to the true equinox of the date, and are free from aberration.